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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,633	07/14/2003	Steven Robert Hetzler	ARC9-2003-0016-US1	9167
55508	7590	10/19/2007	EXAMINER	
JOSEPH P. CURTIN, L.L.C. 1469 N.W. MORGAN LANE PORTLAND, OR 97229-5291			JEAN GILLES, JUDE	
		ART UNIT	PAPER NUMBER	
		2143		
		MAIL DATE	DELIVERY MODE	
		10/19/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/619,633	HETZLER ET AL.	
	Examiner	Art Unit	
	Jude J. Jean-Gilles	2143	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 03 August 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-5,7-18 and 20-26 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 14 July 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 07/30/2007.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

This office action is responsive to the Reply filed on 08/03/2007.

Response to Amendment/Arguments

1. In this amendment no claim had been amended. There are no newly added claims. Claims 1-26 are pending. Claims 1-26 represent a method and apparatus for "MULTIPATH DATA RETRIEVAL FROM REDUNDANT ARRAY".

Applicant's arguments with respect to claims 1 and 14 have been carefully considered, but are not deemed fully persuasive. Applicants' arguments are deemed moot in view of the existing ground of rejection as explained here below. Applicants' amendments to the independent claims are not properly made and as to perhaps place them in condition for allowance.

The dependent claims stand rejected as articulated in the Previous Office Action and all objections not addressed in Applicant's response are herein reiterated.

In response to Applicant's arguments, 37 CFR § 1.11(c) requires applicant to "clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. He or she must show the amendments avoid such references or objections."

Applicants' Request for Reconsideration filed on 08/03/2007 has been carefully considered but is not deemed fully persuasive. However, because there exists the likelihood of future presentation of this argument, the Examiner thinks that it is prudent to address Applicants' main points of contention:

A. Applicants contend that Talagala does not provide a suggestion or motivation to modify Talagala or to combine Talagala and Zhang as proffered by the Examiner.... And Accordingly, if such a suggestion or motivation to modify Talagala or to combine Talagala with Zhang were to exist, it must be provided by Zhang or be in the knowledge generally available to one of ordinary skill in the art. Regarding the knowledge generally available to one of ordinary skill in the art, the Examiner has not specifically identified any such generally available knowledge.

B. Applicants contend More specifically regarding claims 1 and 14, Applicants respectfully submit that neither Talagala nor Zhang disclose or suggest the claimed sorter that is capable of receiving a read request and separating the read request into an appropriate segment size for sending to the storage devices of the data storage system. As support for the Examiner's assertion that Talagala discloses the claimed sorter, the Examiner continues to cite column 10, lines 48-65, of Talagala and continues to subsequently urge to "note that the scrubbing operation here is similar to a read request in which the array controller, in the case of the invention, the sorter, calculate the checksum for every unit of data refers to a segment of data size" (See Office Action dated June 15, 2007, page 3, lines 10-12, line 2; italics in original.)

C. Applicants submit that further regarding claim 1, Applicants respectfully submit that neither Talagala nor Zhang disclose or suggest the claimed assigner that is capable of selecting a read permutation satisfying the received read request, such that the selected read permutation is based at least in part on a predetermined metric, and such that the assigner is capable of sending the selected read permutation to the

storage devices of the storage system. As support for the Examiner's continued assertion that Talagala discloses the claimed assigner, the Examiner cites column 10, line 48, through column 11, line 8, and continues to subsequently urge that "*it is important to acknowledge the teaching of the pre-calculated checksum which in the case of the invention is the predetermined metric which is*" based on the read permutation or the reconstructed data checksum ". (See Office Action dated June 15, 2007, page 3, lines 16-19; italics in original.)

D. Applicants submit that regarding Zhang and the claimed collector, Applicants respectfully submit that the Examiner has provided no details as to what particular portion of Zhang corresponds to the claimed collector. Applicants respectfully request that in the next Office Action the Examiner provide specificity as to where Zhang discloses a collector that is capable of receiving the requested data from the N storage devices in response to the selected read permutation being sent to the storage devices. Applicants will consider an absence of an explanation having specificity in the next Office Action to be a tacit admission by the Examiner that Zhang does not disclose or suggest the claimed assigner.

As to point A, it is the position of the Examiner that reason to combine and proper motivation is provided in light of the knowledge generally available to one of ordinary skill in the art (see the rejection of claim 1 below).

As to point B, the Examiner disagrees with applicants' mischaracterization of the prior art of record, stipulating that neither Talagala, nor Zhang disclose the claimed sorter that is capable of receiving a read request and separating the read request into

an appropriate segment size for sending to the storage devices of the storage data. In fig. 2A, Talagala teaches a sorter or (Storage Array Controller 155), capable of sorting read request for data using special operations called checksum through scrubbing. A unit of data called data segment is calculated from the checksum, sorting the data to verify data on subsequent reads and channel read data into the Array Storage Devices 160.

As to point C, The Examiner once again disagrees with applicants' argument, namely that neither Talagala, nor Zhang disclose the claimed or suggest the claimed assigner that is capable of selecting a read permutation satisfying the received read request, such that the selected read permutation is based at least in part on a predetermined metric, and such that the assigner is capable of sending the selected read permutation to the storage devices of the storage system. Talagala teaches in one embodiment a special file in the file system capable of calculating checksums of read data prior to transferring them in the storage array. This file is the assigner, selecting read data with its checksum and processing the data corresponding to the attached checksum to the storage array. The checksum here is the predetermined metric and the matching of the data used the permutation technique of the claimed invention (see Talagala, column 9, lines 21-41).

As to point D, the collector of the invention is the storage controller of fig. 3, attached to a number of storage devices and capable of receiving the read requested from the N storage devices in response to the read permutation(see Talagala; fig. 3)

Examiner notes that applicant has failed in presenting claims and drawings that delineate the contours of this invention as compared to the cited prior art. Applicants has failed to clearly point out patentable novelty in view of the state of the art disclosed by the references cited that would overcome the 103(a) rejections applied against the claims, the rejection is therefore sustained.

Allowable Subject Matter

2. Claims 6 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-5, 7-18,a and 20-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Talagala et al (Talagala), Patent No. 7,017,107 B2 in view of Zhang, U.S. Patent No 7,020,394 A1.

Regarding claim 1, Talagala teaches the invention substantially as claimed. a Talagala discloses a pathway determination system for a data storage system having N storage devices and more than N pathways for retrieving requested data from the data storage system (fig. 2A; fig. 2B), the pathway determination system comprising:

a sorter capable of receiving a read request and separating the read request into an appropriate segment size for sending to the storage devices of the data storage system (fig. 2A, items 150, 155, and 160; column 10, lines 48-65; *note that the scrubbing operation here is similar to a read request in which the array controller, in the case of the invention, the sorter, calculate the checksum for every unit of data refers to a segment of data size...*);

an assigner capable of selecting a read permutation satisfying the received read request, the selected read permutation being based at least in part on a predetermined metric, and the assigner being capable of sending the selected read permutation to the storage devices of the storage system (*column 9, lines 21-41; column 10, lines 48-67; column 11, lines 1-8*); and

a collector capable of receiving the requested data from the N storage devices in response to the selected read permutation being sent to the storage devices (column 4, lines 1-10; *the disk controller plays the role of the collector, "receiving the read data from within a data range from at least one of the disk drives"*).

Applicants suggest in the Reply dated 08/03/2007 that Talagala does not disclose the details of determining a particular pathway through the interconnection fabric other than the general concept that multiple independent paths may allow a

source node and a destination node to continue communicating with each other even if one or more communication paths or nodes between the source and destination nodes become inoperative.

In the same field of endeavor, Zhang discloses a method in which "...*A method of determining a shortest path between a source node and a destination node in an optical network having plural network nodes interconnected with optical transmission links, the method comprising: assigning an electronic node to each network node, the electronic node representing an electronic switching fabric interconnecting optical-electrical-optical (OEO) transmitters and receivers of the network node; assigning optical channel nodes to each network node, each optical channel node representing an optical cross-connect for an optical channel available at the network node...* [see Zhang, Abstract; column 6, lines 61-67; column 7, lines 1-6]. This interconnection mechanism enables memory system 130 of fig. 2 to include program code for determining an optimal path through the network (see Zhang, col. 3, lines 22-36).

Accordingly, it would have been obvious to one of ordinary skill in the networking art at the time the invention was made to have incorporated Zhang's teachings of a method determining a particular pathway through the interconnection fabric, with the teachings of Talagala, for the purpose of "significantly increases the computational efficiency...thereby ensuring the lowest cost path, where the cost typically reflects the usage of equipment and facilities along the path (see Zhang, abstract and summary of invention). By this rationale **claim 1** is rejected.

Regarding **claim 2**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the assigner further capable of generating the read permutations satisfying the received read request (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 3**, The combination Talagala-Zhang discloses the system according to claim 2, wherein the assigner generates the read permutations before the read request is received (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 4**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the assigner comprises: a permutation generator capable of generating the read permutations (column 10, lines 48-67; column 11, lines 1-8); and a cost calculator capable of calculating an expense of each permutation based on the predetermined metric (figs. 7A-B, and 8; column 14, lines 29-50).

Regarding **claim 5**, The combination Talagala-Zhang discloses the system according to claim 4, wherein the cost calculator capable of utilizing queue length information and estimated current cost information, and wherein the permutation generator capable of generating a reduced number of read permutations based at least in part on the queue length information and the estimated current cost information (figs. 7A-B, and 8; column 14, lines 29-64).

Regarding **claim 7**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the storage system comprises at least one failed storage device (column 9, lines 57-67; column 10, lines 1-13).

Regarding **claim 8**, The combination Talagala-Zhang discloses the system according to

claim 1, wherein the metric is dynamically changed based at least in part on a change in operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 9**, The combination Talagala-Zhang discloses the system according to claim 8, wherein the metric is periodically changed based at least in part on operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 10**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on a current workload balance for the storage devices of the data system (column 14, lines 29-64).

Regarding **claim 11**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on an estimated delay before the requested data can be retrieved from the storage devices of the storage system (column 10, lines 25-41).

Regarding **claim 12**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on a number of outstanding requests in the queue of a storage device of the storage system (column 14, lines 29-64).

Regarding **claim 13**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on a total queue for all outstanding requests that have been received by the storage system (column 14, lines 29-64).

Regarding **claim 14**, The combination Talagala-Zhang discloses a method for determining a pathway for obtaining data stored in a data storage system having N storage devices and more than N pathways for retrieving requested data from the data storage system, the method comprising steps of:

receiving a read request from a requester (column 10, lines 48-65);

separating the read request into an appropriate segment and size for sending the storage devices of the data storage system (column 10, lines 48-65; *note that the scrubbing operation here is similar to a read request in which the array controller, in the case of the invention, the sorter, calculate the checksum for every unit of data refers to a segment of data size...*);

selecting a read permutation from possible read permutations satisfying the received read request; sending the selected read permutation to the storage devices of the storage system column 10, lines 48-67; column 11, lines 1-8); receiving the requested data from the N storage devices in response to the selected read permutation being sent to the storage devices; and returning the satisfied read request to the requester (see Talagala; column 4, lines 1-10; see Zhang, *Abstract*; column 6, lines 61-67; column 7, lines 1-6].).

Regarding **claim 15**, The combination Talagala-Zhang discloses the method according to claim 14, further comprising a step of generating the read permutations satisfying the received read request (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 16**, The combination Talagala-Zhang discloses the method according to claim 15, wherein the step of generating the read permutations is performed before the read request is received (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 17**, The combination Talagala-Zhang discloses the method according to claim 15, further comprising a step of calculating an expense of each permutation based at least in part on the predetermined metric (figs. 7A-B, and 8; column 14, lines 29-50).

Regarding **claim 18**, The combination Talagala-Zhang discloses the method according to claim 17, further comprising steps of: generating queue length information and estimated current cost information, and generating a reduced number of read permutations based at least in part on the queue length information and the estimated current cost information (figs. 7A-B, and 8; column 14, lines 29-50).

Regarding **claim 20**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the storage system includes at least one failed storage device (column 9, lines 57-67; column 10, lines 1-13).

Regarding **claim 21**, The combination Talagala-Zhang discloses the method

according to claim 14, further comprising a step of dynamically changing the metric based at least in part on a change in operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 22**, The combination Talagala-Zhang discloses the method according to claim 14, further comprising a step of periodically changing the metric based at least in part on operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 23**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a current workload balance for the storage devices of the data system (column 2, lines 4-26).

Regarding **claim 24**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on an estimated delay before the requested data can be retrieved from the storage devices of the storage system (column 10, lines 25-41).

Regarding **claim 25**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a number of outstanding requests in the queue of a storage device of the storage system (column 14, lines 29-64).

Regarding claim 26, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a total queue for all outstanding requests that have been received by the storage system (column 14, lines 29-64).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jude J. Jean-Gilles whose telephone number is 571-272-3914. The examiner can normally be reached on 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wiley can be reached on (571)272-3923. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jude Jean-Gilles

Patent Examiner

Art Unit 2143

October 11, 2007



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